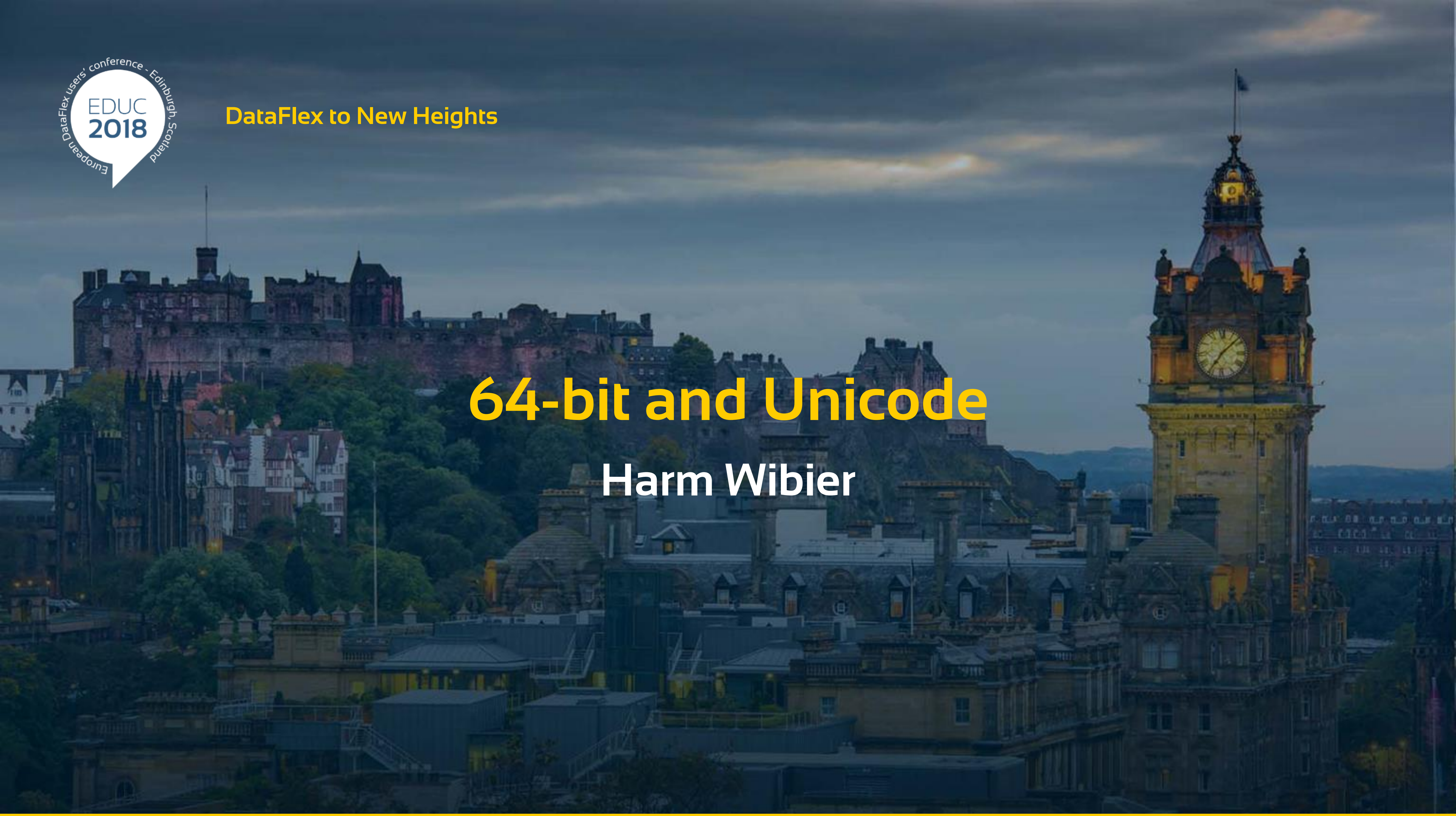
European DataFlex users' conference - Edinburgh, Scotland

EDUC 2018

DataFlex to New Heights



64-bit and Unicode

Harm Wibier

The new DataFlex

- Work started 1.5 years ago on a new version of DataFlex
  - Planning started way before that..
- Dedicated resources were hired for the project

- Codename: NextGen

- 64-bit capable
- Fully Unicode

64-bit

What is 64-bit?

- The registry size of the processor
- Width of a memory address

- Since 1995 we used 32-bits
  - Could address up to 4GB of memory
- Since 2001 64-bit versions of windows were available
  - Can address a lot more gigabytes of memory..
  - Not everyone moved to 64-bit directly
  - 64-bit windows can run 32-bit software

Why do I need 64-bit?

- Because the world is moving towards 64-bit
- Communicate with other 64-bit software
- To be more competitive

64-bit capable

- You will choose per project between 64-bit and 32-bit

- We expect 32-bit to be around for a while
  - A 64-bit application cannot use 32-bit DLLs
    - This includes COM components
    - All third party components you use need to be 64-bit
  - You need time to migrate your code

- New projects should be 64-bit by default

Language changes

- New LongPtr type
  - Integer type that is the same size of a pointer
    - 32-bit on 32-bit and 64-bit on 64-bit
  - Integer stays 32-bit
- Pointer is now an Address
  - Used to be an integer
- Handle becomes LongPtr
- New compiler switch

```
#REPLACE Pointer Integer
#REPLACE Handle Integer
```

⬇

```
#REPLACE Pointer Address
#REPLACE Handle LongPtr
```

```
#IFDEF IS$WIN64

#ELSE

#ENDIF
```

Package changes

- Various Integer to LongPtr changes
    - External API's
    - Window messages
- Several Integer to Address changes
    - Invalid usage of Integer
        - Bad habits since the beginning of DataFlex ☺

Internal changes

- Lots of changes in the C code of the runtime
  - Pointers were passed as integer…
- Multiple expression evaluator changes
  - Caused by the new LongPtr type
- Brand new linker
  - The part of the compiler producing the executable
  - Already in 19.1 (embed manifest files!)
- Converted all dependencies

Demo...

What do I need to do?

- All your third party dependencies need to be 64-bit
  - All DLL’s / COM controls
  - COM API’s might be slightly different on 64-bit
- Changes *might* be needed in your code
  - No pointers in integers any more!
  - External API’s might require the use of LongPtr
  - Mostly in more low level code
- <u>Not a line of code changed in Order Entry</u>

- With 19.1 we start helping you prepare

Status

- Most of the work is done
  - We have a pretty stable environment
- Finishing touches are needed
- Lots of testing is needed

- The 80% / 20% rule might apply…

Unicode

What is Unicode?

- Characters are traditionally stored in 8 bits (1 byte)
  - 8 bits limits the number of available characters to 256
- Several different encoding types are used
  - OEM
  - ANSI
- Unicode supports the usage of more bytes per character
  - This allows more characters to be used (100.000 are currently standardized)
  - With Unicode all written languages can be captured

History…

- ASCII
  - 7 bits per character (128 characters)
  - Latin letters, numbers and reading symbols
- OEM
  - 8 bits per character (256 characters)
  - First 128 characters compatible with ASCII
  - Codepage being used determines the other 128 characters
- ANSI
  - 8 bits per character (256 characters)
  - First 128 characters compatible with ASCII
  - Codepage being used determines the other 128 characters

Unicode makes things easier?

- Different encodings
  - UCS-2
  - UTF-8
  - UTF-16
  - UTF-16BE
  - UTF-32

- Characters have different sizes in memory
  - Also with UTF-16, even with UTF-32
  - Exception is UCS-2 which is antiquated technology
  - Complicates string functions

- Unicode is pretty much just the set of characters

Why do I need Unicode?

- To support multiple languages in a single application
  - Web applications used in multiple countries
  - Store names of people
- To support languages that need Unicode
- Support smiley faces ☺
- To be more competitive

Unicode in DataFlex

- The String becomes Unicode
  - Unicode from the core approach
  - Not the bolt-on solution
- UTF-8 as encoding for strings in memory
  - Improved backwards compatibility
  - Web is already UTF-8
- Source code will be stored as UTF-8
  - Symbols in the language remain to be only ASCII
  - Literals can contain non ASCII characters

- These are not final decisions
  - This are the directions we are taking right now!

Demo...

What code changes are needed?

- Convert from using the A version of windows API functions to using the W version
  - Since Windows is UTF-16 a conversion will be needed
  - Not making the conversion will work but it will not display non-ASCII characters properly
- Remove / change all conversions
  - ToOEM / ToANSII indicates that something needs to change
- Check string manipulations
  - Bytes do not equal code points any more
  - We might provide a new set of string functions
- Not a line of code changed in Order Entry

Database in NextGen

- SQL will be the expected database
  - MS SQL supports Unicode with special field types
    - nvarchar, nchar, ntext
- Continuity of the Embedded database is undetermined
  - Options being researched are:
    - Not supporting embedded database
    - Continued support without Unicode (OEM / ANSI data)
      - Collating sequence will be a challenge
      - Might not be compatible with older DataFlex versions
    - Making Embedded work with Unicode
      - Will not be compatible with older DataFlex versions

Status

- Working prototype
  - I knew where I could click without it blowing up!
- Lots of components still need to be converted
- Lots of problems to be solved
  - How will we handle collating sequences?
  - How are we going to handle buffer sizes?
  - Do we need new string functions?
- We might still run into walls…

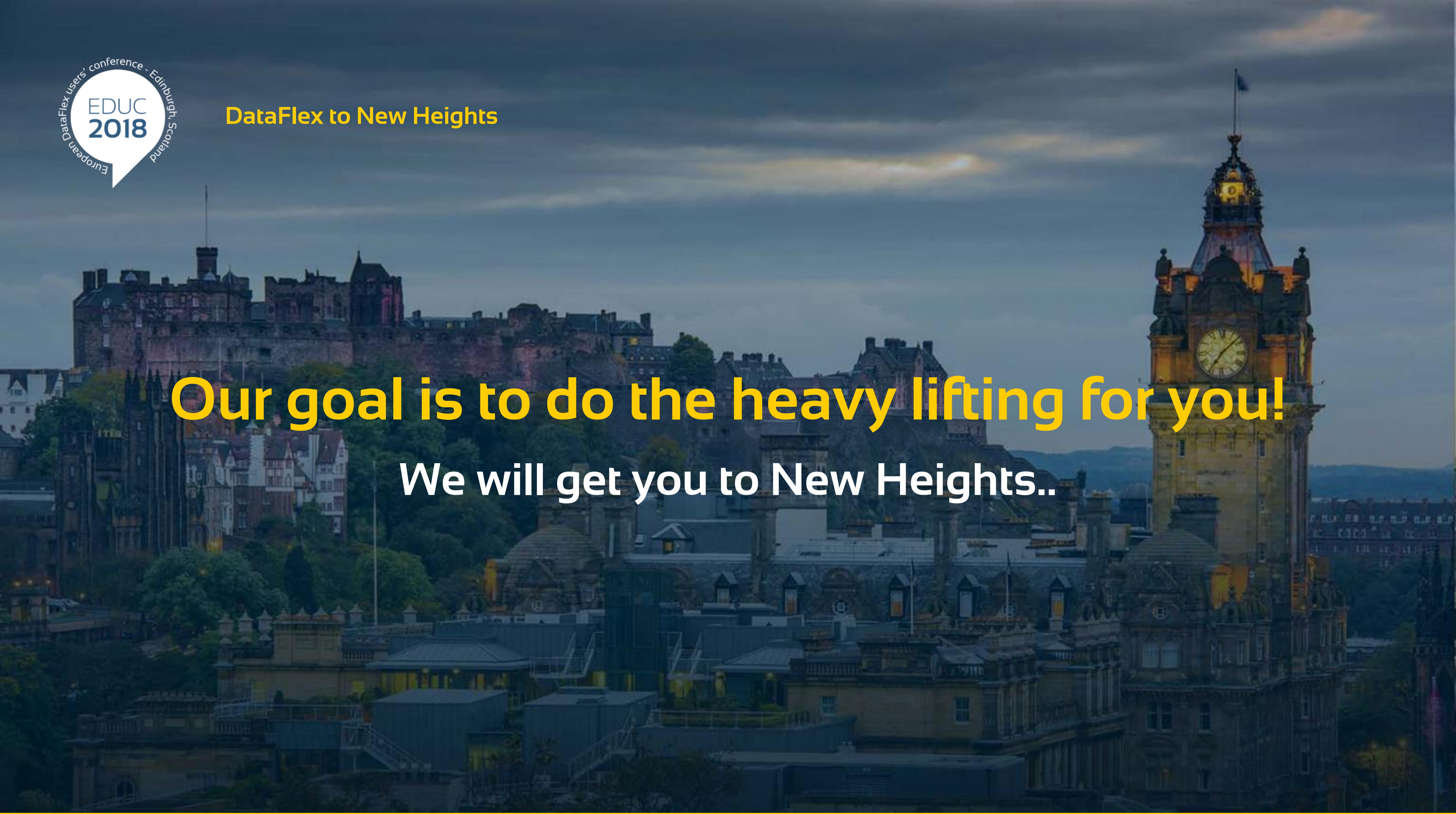
Environment

The NextGen environment..

- All tools will be 64-bit (Studio, DB Explorer, ..)
  - They will support building and debugging 32-bit applications
- WebApp Server will be 64-bit
  - It will support running 32-bit webapps
- Client installer
  - Will support running both 64-bit and 32-bit applications
  - Will work on 32-bit only machines

The current DataFlex..

- Will be continued to be supported for a while
  - Based on the current codebase
  - New features will be back ported
  - So for a while there will be 2 versions DataFlex
- Gives the new DataFlex time to mature
  - Experience with converting will grow in the community
- Gives you more time to migrate



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Our goal is to do the heavy lifting for you!

We will get you to New Heights..

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Thank you!

Are there any questions?